



NATIONAL
Electronics, Inc.

—PRODUCT INFORMATION—

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12AU7-A

Twin Triode

The 12AU7-A is a miniature medium-mu twin triode intended for service in radio and television receivers or in audio amplifiers. The tube is suitable for use in a variety of stages, such as general-purpose amplifier, phase inverter, oscillator, or multivibrator.

The electrical characteristics of the 12AU7-A and 12AU7 are essentially equivalent. As compared to the 12AU7, the 12AU7-A exhibits a lower microphonic output.

GENERAL

ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

| | Series | Parallel | |
|---------------------------------------|----------------|---------------|---------|
| Heater Voltage, AC or DC | 12.6 ± 1.3 | 6.3 ± 0.6 | Volts |
| Heater Current | 0.15 | 0.3 | Amperes |
| Direct Interelectrode Capacitances | | | |
| Grid to Plate: (g to p), Each Section | 1.5 | | pf |
| Input: g to (h + k), Each Section | 1.6 | | pf |
| Output: p to (h + k), Section 1 | 0.5 | | pf |
| Output: p to (h + k), Section 2 | 0.35 | | pf |

MECHANICAL

Operating Position - Any

Envelope - T-6½, Glass

Base - E9-1, Small Button 9-Pin

Outline Drawing - EIA 6-2

Maximum Diameter 0.875 Inches

Maximum Over-all Length 2.187 Inches

Maximum Seated Height 1.937 Inches

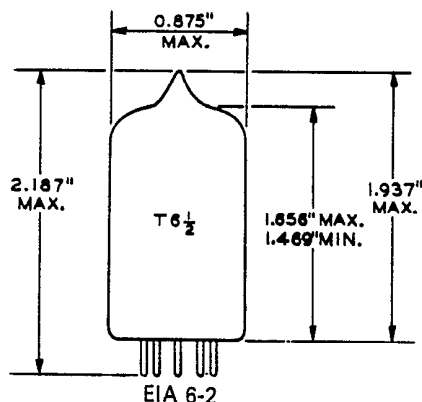
MAXIMUM RATINGS

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making allowance for the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration.

The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all other electron devices in the equipment.

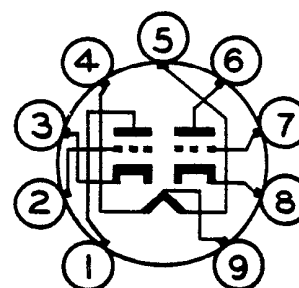
PHYSICAL DIMENSIONS



TERMINAL CONNECTIONS

- Pin 1 - Plate (Section 2)
- Pin 2 - Grid (Section 2)
- Pin 3 - Cathode (Section 2)
- Pin 4 - Heater
- Pin 5 - Heater
- Pin 6 - Plate (Section 1)
- Pin 7 - Grid (Section 1)
- Pin 8 - Cathode (Section 1)
- Pin 9 - Heater Center-Tap

BASING DIAGRAM



EIA 9A

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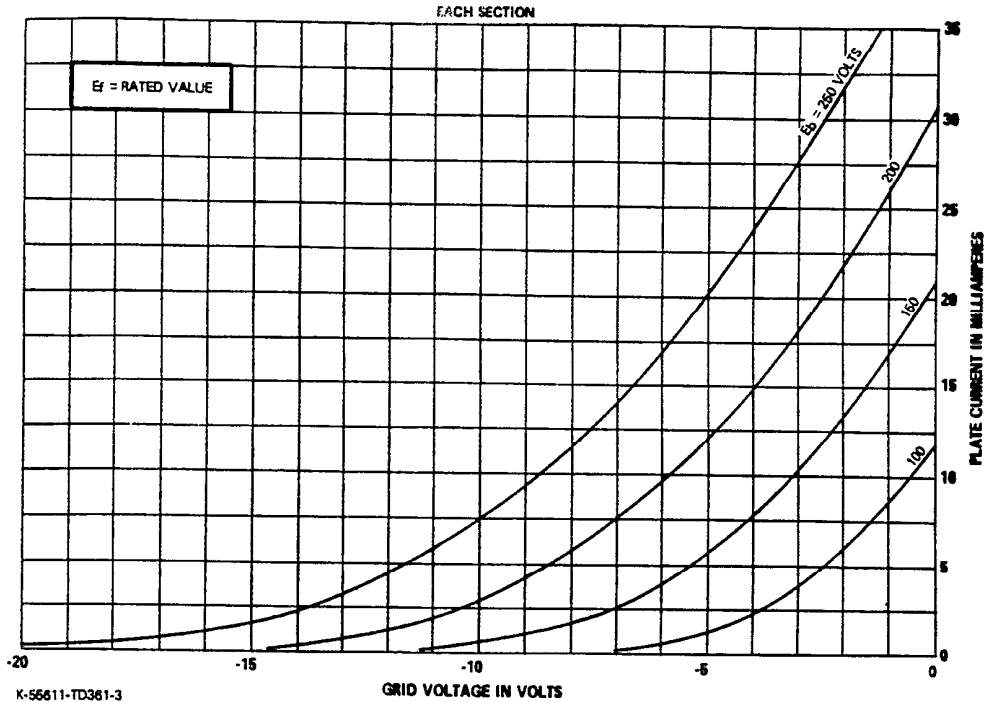
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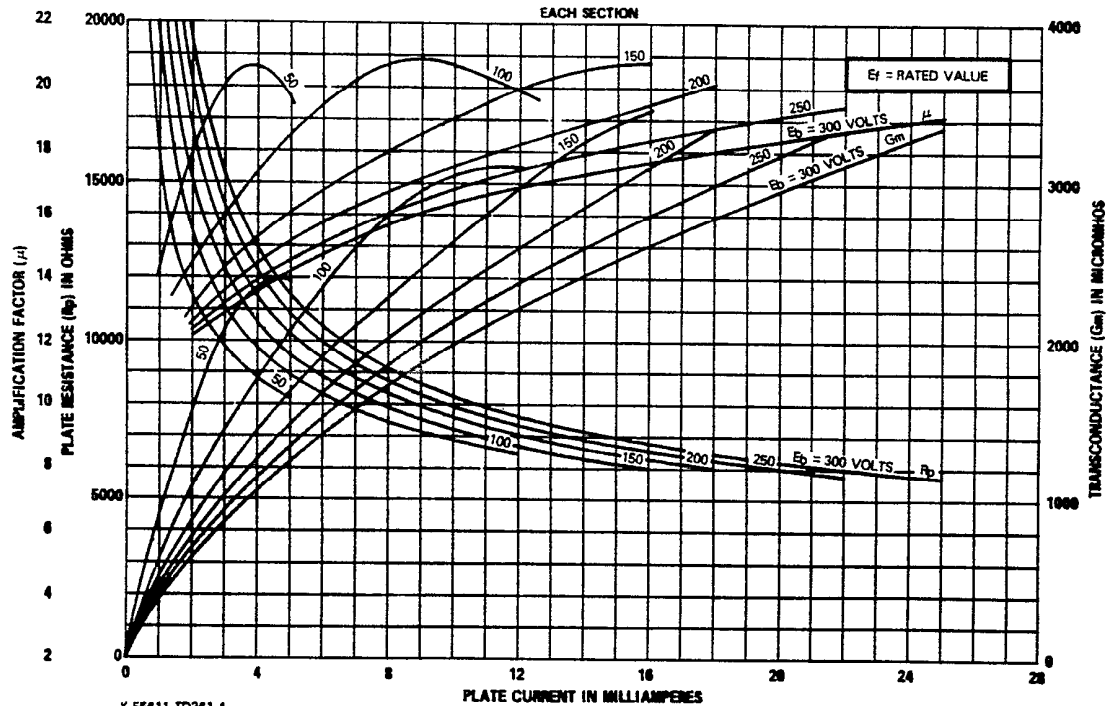
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AVERAGE TRANSFER CHARACTERISTICS



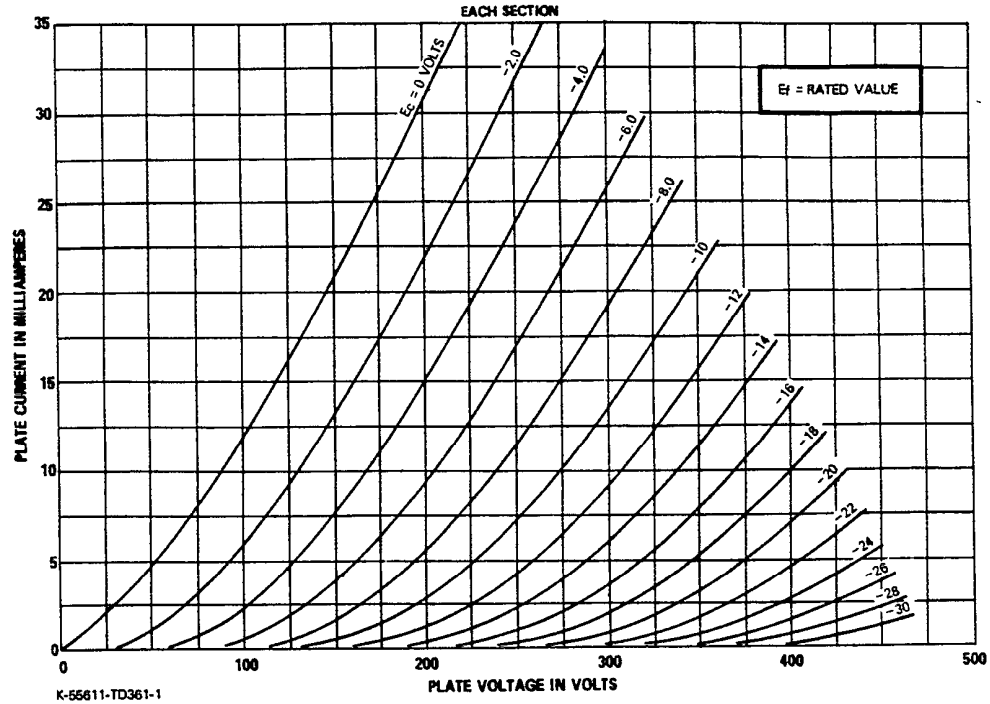
AVERAGE CHARACTERISTICS



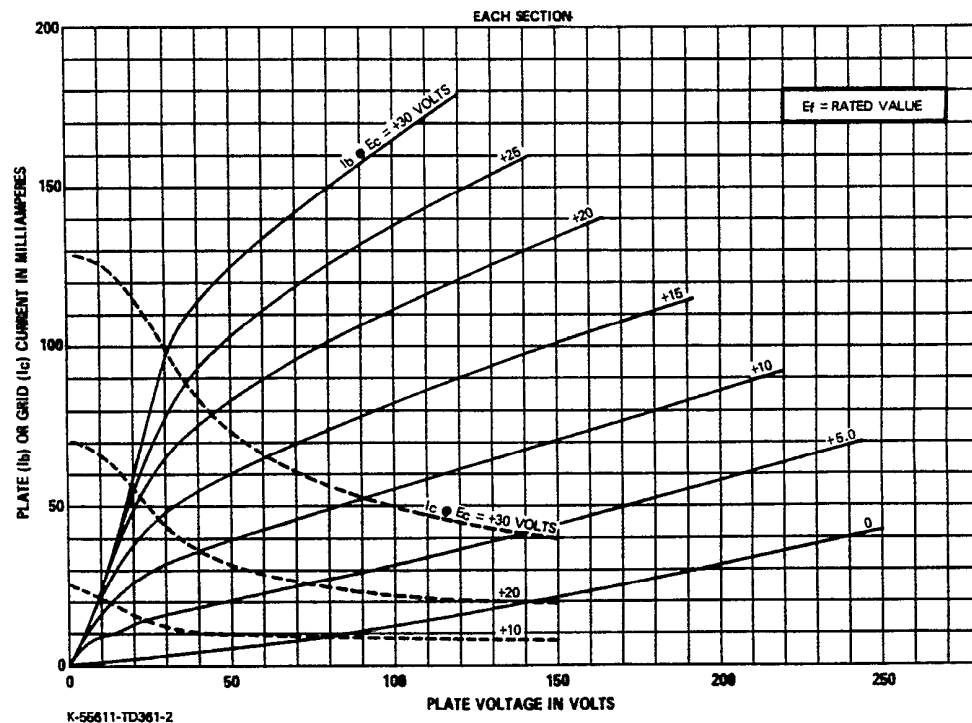
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AVERAGE PLATE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS



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MAXIMUM RATINGS (Cont'd)

DESIGN-MAXIMUM VALUES UNLESS OTHERWISE INDICATED, EACH SECTION

| | Class A ₁ Amplifier | Vertical Deflection Amplifier* | Vertical Oscillator Service* | Horizontal Oscillator Service* | |
|---|-----------------------------------|--------------------------------------|------------------------------------|--------------------------------------|--------------|
| DC Plate Voltage | 330 | 330 | 330 | 330 | Volts |
| Peak Positive Pulse Plate Voltage | --- | 1200♦ | --- | --- | Volts |
| Peak Negative Grid Voltage | --- | 275 | 440 | 660 | Volts |
| Plate Dissipation | | | | | |
| Each Plate | 2.75 | 2.75▲ | 2.75 | 2.75 | Watts |
| Both Plates | 5.5 | 5.5▲ | 5.5 | 5.5 | Watts |
| DC Cathode Current | 22 | 22 | 22 | 22 | Milliamperes |
| Peak Cathode Current | --- | 66 | 66 | 330 | Milliamperes |
| Heater-Cathode Voltage | | | | | |
| Heater Positive with respect to Cathode | | | | | |
| DC Component | 100 | 100 | 100 | 100 | Volts |
| Total DC and Peak | 200 | 200 | 200 | 200 | Volts |
| Heater Negative with respect to Cathode | | | | | |
| Total DC and Peak | 200 | 200 | 200 | 200 | Volts |
| Grid Circuit Resistance | | | | | |
| With Fixed Bias | 0.25 | --- | 2.2 | 2.2 | Megohms |
| With Cathode Bias | 1.0 | 2.2 | 2.2 | 2.2 | Megohms |

CHARACTERISTICS AND TYPICAL OPERATION

CLASS A₁ AMPLIFIER, EACH SECTION

| | | | |
|--|------|------|--------------|
| Plate Voltage | 100 | 250 | Volts |
| Grid Voltage | 0 | -8.5 | Volts |
| Amplification Factor | 20 | 17 | |
| Plate Resistance, approximate | 6500 | 7700 | Ohms |
| Transconductance | 3100 | 2200 | Micromhos |
| Plate Current | 11.8 | 10.5 | Milliamperes |
| Grid Voltage, approximate | | | |
| I _b = 10 Microamperes | --- | -24 | Volts |

NOTES

- * The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.
- Heater current of a bogey tube at bogey heater voltage.
- Without external shield.
- ⊙ For operation in a 525-line, 30-frame television system as described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Com-

munications Commission. The duty cycle of the voltage pulse must not exceed 15 percent of one scanning cycle.

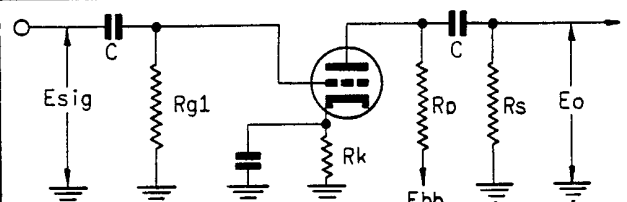
- ♦ Value given is to be considered as an Absolute-Maximum Rating. In this case, the combined effect of supply voltage variation, manufacturing variation including components in the equipment, and adjustment of equipment controls should not cause the rated value to be exceeded.

- ▲ In stages operating with grid-leak bias, an adequate cathode-bias resistor or other suitable means is required to protect the tube in the absence of excitation.

CLASS A RESISTANCE-COUPLED AMPLIFIER

EACH SECTION

| R _p Meg. | R _s Meg. | R _{g1} Meg. | E _{bb} = 90 Volts | | | E _{bb} = 180 Volts | | | E _{bb} = 300 Volts | | |
|------------------------|------------------------|-------------------------|----------------------------|------|----------------|-----------------------------|------|----------------|-----------------------------|------|----------------|
| | | | R _k | Gain | E _o | R _k | Gain | E _o | R _k | Gain | E _o |
| 0.10 | 0.10 | 0.10 | 3900 | 10 | 10 | 3600 | 11 | 20 | 3500 | 11 | 30 |
| 0.10 | 0.24 | 0.10 | 5000 | 11 | 14 | 4700 | 12 | 27 | 4400 | 12 | 41 |
| 0.24 | 0.24 | 0.10 | 9400 | 11 | 13 | 8700 | 11 | 25 | 8700 | 12 | 38 |
| 0.24 | 0.51 | 0.10 | 11000 | 11 | 17 | 11000 | 12 | 32 | 11000 | 12 | 48 |
| 0.51 | 0.51 | 0.10 | 19000 | 11 | 15 | 18000 | 12 | 29 | 18000 | 12 | 43 |
| 0.51 | 1.00 | 0.10 | 24000 | 11 | 19 | 23000 | 12 | 37 | 23000 | 12 | 54 |
| 0.24 | 0.24 | 10 | 0 | 14 | 12 | 0 | 16 | 20 | 0 | 17 | 28 |
| 0.24 | 0.51 | 10 | 0 | 14 | 16 | 0 | 16 | 28 | 0 | 17 | 40 |
| 0.51 | 0.51 | 10 | 0 | 14 | 15 | 0 | 15 | 26 | 0 | 16 | 38 |
| 0.51 | 1.00 | 10 | 0 | 14 | 19 | 0 | 16 | 35 | 0 | 16 | 52 |



Note: Coupling capacitors (C) should be selected to give desired frequency response. R_k should be adequately by-passed.

Notes: 1. E_o is maximum RMS voltage output for five percent (5%) total harmonic distortion. 2. Gain measured at 2.0 volts RMS output. 3. For zero-bias data, generator impedance is negligible.